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**ITU MATTERS, INCLUDING RADIO COMMUNICATION
ITU-R STUDY GROUP 8 MATTERS**

**ICAO position on issues of critical concern to civil aviation to be decided at the
ITU World Radiocommunication Conference (2000) (WRC-2000)**

Submitted by the International Civil Aviation Organization (ICAO)

SUMMARY

Executive summary: This paper provides information on ICAO's position on issues of critical concern to civil aviation to be decided at the ITU World Radiocommunication Conference (2000) (WRC-2000).

Action to be taken: Note the information provided.

Related documents:

1 The International Civil Aviation Organization (ICAO) Council, at the ninth meeting of its 157th Session on 18 June 1999, approved the ICAO position on issues of critical concern to aviation which are on the agenda of the International Telecommunication Union (ITU) World Radiocommunication Conference (2000) (WRC-2000), which is planned to be held from 8 May to 2 June 2000 in Istanbul, Turkey.

2 The main principles which governed the development of the ICAO position are summarized as follows:

- (a) ITU Radio Regulations need to ensure that the safety of civil aviation is not compromised;
- (b) ITU Radio Regulations shall not be in conflict with ICAO Standards and Recommended Practices; and
- (c) frequency allocations to aeronautical safety-of-life services shall be protected in conformity with internationally agreed requirements. Changes to frequency allocations need to be supported by adequate studies in the ITU-R Sector or in ICAO, as appropriate.

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3 The ICAO position takes into consideration the currently available results of studies on allocation matters which took place in the ITU Radiocommunication Sector. The results of the work to date in the various ITU-R Study Groups have also been considered in preparation for the upcoming Conference Preparatory Meeting (CPM) to be held from 15 to 26 November 1999 in Geneva, Switzerland.

4 In particular, the following critical aviation-related subjects will be raised at the ITU WRC-2000:

- (a) the need to ensure protection of the GNSS. Proposals to allocate a part of the band used for GNSS (1 559 - 1 610 MHz) to the mobile-satellite service (MSS) (space-to-Earth) have been proved effectively unfeasible and should not be considered. Furthermore, existing footnote allocations to the fixed-service in the same band should be deleted; and
- (b) the need to ensure protection of the AMS(R)S. At the WRC-97, the exclusive allocation to the AMS(R)S was replaced with an allocation to the generic MSS. The new allocation, in the opinion of ICAO, does not provide adequate safeguards for AMS(R)S use, and measures should be taken to improve the situation at WRC-2000.

5 The approved ICAO position will be submitted by ICAO to the ITU WRC-2000 in the form of an information paper. Furthermore, prior to WRC-2000, new developments on spectrum issues, resulting from studies under way in ICAO and ITU, may require that additional material, complementing the ICAO position, be submitted to the conference.

6 The ICAO position was circulated to Contracting States and international organizations with ICAO State Letter E 3/5-99/74 dated 9 July 1999 requesting them to support our position at WRC-2000. Relevant extracts of the ICAO position are provided in the attachment to this information paper. Due to length constraints, background information supporting the ICAO position is not included and it can be found in the aforementioned State letter.

ANNEX

**Extracts of ICAO position at the ITU World Radiocommunication
Conference (2000) (WRC-2000)**

(Note.- Complete document including background information is provided in ICAO State Letter E 3/5-99/74 dated 9 July 1999)

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2. SPECTRUM REQUIREMENTS FOR INTERNATIONAL CIVIL AVIATION

2.1 The safety of air operations is vitally dependent on the availability of communications and navigation services that are reliable and free from harmful interference. Continuous contact between pilot and ground with a safety message every few minutes in high-traffic density conditions is necessary to provide an air traffic service and to avoid collision in the air. Systems for navigation must be available for all phases of flight. Satellite systems for use in aircraft are now a fully mature technology and are foreseen to provide practical and realizable benefits, which can materially contribute to operational enhancements. Future strategies, based on an increased use of space-based systems, have been agreed as international civil aviation policy through the principles established in the ICAO communications, navigation, and surveillance/air traffic management (CNS/ATM) systems. The associated high reliability and availability requirements demand special conditions to avoid harmful interference to these systems.

2.2 For the future, the radio frequency spectrum needs for civil aviation arising from the increased growth in air transport is stable, and no major adjustments in the current allocations are foreseen, as these appear capable of meeting currently known requirements for the future. In recent World Radiocommunication Conferences, however, the spectrum allocated to aeronautical services has been reduced in some bands; in other bands, sharing with non-aeronautical services was adopted notwithstanding strong aviation opposition. As a consequence of these measures, the remaining allocations will need to be fully utilized in order to accommodate the expected traffic growth. Modern technology, better modulation methods and the use of satellites will all contribute to achieve the objective of satisfying demands.

2.3 The introduction of the above-mentioned sharing scenarios must be considered with extreme care. In cases of high operational criticality (such as precision approach and landing), they must be thoroughly proven in real life before the implementation. This may be difficult and risky when expensive satellite systems are being considered and when real-time tests are normally impractical. As a consequence of these difficulties, the international civil aviation community retains the firm opinion that high critical operational systems, such as those used for low visibility approach and landing, should always operate in exclusive frequency bands.

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3.1 **WRC-2000 Agenda Resolves 1.1 — Requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)**

3.1.1 [Background]

3.1.2 **ICAO POSITION**

3.1.2.2 **To support deletion of footnotes S5.355 and S5.359 from the band 1 559 - 1 610 MHz, or establish a closing date, not later than 2005, after which the fixed service would cease to operate in this band.**

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3.8 **WRC-2000 Agenda Resolves 1.7 — Review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution 346 (WRC-97)**

3.8.1 - 3.8.4 [Background]

3.8.5 **ICAO POSITION**

3.8.5.1 **To support measures that can lead to a removal of all unauthorized use of the frequencies allocated to the aeronautical mobile (R) service between 2 850 and 22 000 kHz.**

Note.— For more information refer to the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies (Doc 9718), Chapter 7, Section 2 850 - 22 000 kHz.

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3.10 **WRC-2000 Agenda Resolves 1.9 — To take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559 - 1 567 MHz frequency range, in response to Resolutions 213 (WRC-97) and 220 (WRC-97)**

3.10.1 The band 1 559-1610 MHz is allocated, on a primary basis, to the aeronautical radionavigation service and the radionavigation satellite service. Two GNSS elements, GLONASS and GPS, are currently in operation in this band. The GNSS has been chosen as a core navigation technology of the ICAO CNS/ATM systems. The ICAO GNSS Panel is developing worldwide Standards and Recommended Practices (SARPs) for incorporation in ICAO Annexes. Navigation capability for all types of aircraft for en-route, terminal, precision approach and aerodrome surface operations is envisaged, involving use of the band for augmentation systems such as pseudolites, operating in the band 1559 - 1 575 MHz and for future satellite navigation systems. As a ground-based emitter, the pseudolite augments the availability of the GNSS by providing an additional ranging signal for the approach phase of flight.

3.10.2 Any sharing of this band with other systems has the potential to cause harmful interference to safety critical aeronautical services and is intrinsically unacceptable. The protection of a radionavigation service requires special treatment under the ITU Radio Regulations, effectively creating a situation of rights to be observed by any other services that may cause harmful interference.

3.10.3 In the case of the GNSS, an array of measures, both administrative and technical, is necessary to assure complete protection at all times. These measures would include adequate coordination and control, enabling immediate remedial action when harmful interference occurs. Technical provisions are an essential part of the protection structure and will require continuation of study in ITU-R and in ICAO, taking account of all the necessary operational features envisaged.

3.10.4 Resolution 220 (WRC-97), which addresses the study on the feasibility of operating a mobile-satellite service (space-to-Earth), includes technical criteria and operational and safety requirements for the aeronautical radionavigation service.

3.10.5 Studies on the feasibility of sharing are being progressed in various fora, including the GNSS Panel. The results indicate that practical and safe sharing conditions cannot be established. In particular, it has been concluded that, in order to protect GNSS systems, MSS space-to-Earth transmissions must be limited to minus 138 dBW/m²/MHz for wideband signals, and minus 148 dBW/m²/MHz for narrowband signals. With the current state of the art, MSS systems limited to these low power flux densities are not feasible. Apart from aviation safety considerations, restrictions which constrain the aeronautical use or further development of existing and envisaged systems are not acceptable to aviation.

3.10.6 It is essential to ensure that, in the future, the total band for GNSS (1 559-1 610 MHz) remain free from interference from non-aeronautical sources. In particular, no allocation to the mobile-satellite service should be made. Resolution 220 (WRC-97) should be deleted from the Radio Regulations as studies on this issue of sharing GNSS with MSS have concluded that such sharing is not feasible.

3.10.7 ICAO POSITION

- 3.10.7.1 (a) **no allocation should be made to the MSS service in the band 1 559-1 567 MHz; and**
- (b) **delete Resolution 220**

Note.— For more information refer to the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies (Doc 9718), Chapter 7, Section 1 559 - 1 626.5 MHz)

3.11 WRC-2000 Agenda Resolves 1.10 — To consider results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97) and take appropriate action on this subject

3.11.1 At the WRC-97, strong reservations were expressed by the aeronautical and maritime community on the feasibility of introducing an allocation to the mobile satellite service (generic) in respect of a number of important technical and operational points affecting the aeronautical and maritime mobile-satellite services. Principally, these reservations relate to the need to assure that adequate access to the radio frequency spectrum is available as and when it is needed. Also, concern was expressed with respect to the feasibility of preemption between networks. WRC-97 agreed to a generic allocation to the mobile-satellite service at 1.5/1.6 GHz. Footnote S5.357A was established with the intention of providing access in the future to the AMS(R)S and gives priority to AMS(R)S when coordinating spectrum. There are now serious concerns that footnote S5.357A is ineffective in the situation where all of the allocation is in use, and no release can be agreed. This would appear to negate the intention of the provision, and create the situation of no access as referred to in the ICAO input to WRC-97. Also the introduction of a priority and pre-emption mechanism within and between satellite systems, is becoming questionable. These mechanisms add extra cost and complexity to the systems. This situation must be revisited at WRC-2000 and a more positive mechanism put in place. A number of other aspects of concern to aviation were included in the request to ITU-R study groups to consider and to report to WRC-2000.

3.11.2 The results of ICAO studies of future spectrum requirements are now available. In respect of spectrum estimates, the long-term requirement for AMS(R)S for the various world areas are: 10.8 MHz up to 2010 and 18 MHz beyond that time frame. These are for safety purposes only and do not include requirements for public correspondence.

3.11.3 The preemption type solution to secure aviation access to the RF spectrum solution has been considered recently in ITU and it has been concluded that this solution is expected to add additional cost and operational complexity in network control systems and network operations, in comparison to systems without full pre-emption capabilities. Further studies on the possibility to provide priority and pre-emption between different services operating within a single system, as well as between systems, are required. Therefore, it is expected that these options might only be implemented in satellite systems in the longer term.

3.11.4 The ITU considered also that the current of capacity planning, where on a regular basis spectrum is reserved for exclusive aeronautical communications, may satisfy the spectrum requirements for AMS(R)S in the near future, due to the low growth rate of AMS(R)S communications. The cooperation of MSS operators is an important element in the process of capacity planning.

3.11.5 There are in aviation considerable doubts on the capability of the present generic allocation to satisfy aeronautical spectrum requirements to meet the future needs of the AMS(R)S.

3.11.6 ICAO POSITION

- 3.11.6.1 (a) **to support the spectrum requirements of 10.8 MHz up to 2 010 and 18 MHz beyond 2010;**
- (b) **to recover the exclusive allocation of the bands 1 545 - 1 555 MHz and 1 646.5 - 1 656.5 MHz to AMS(R)S , unless**
- (c) **adequate technical and regulatory provisions are agreed to:**
- 1) **guarantee the availability of spectrum for aeronautical communications as required; and**
 - 2) **ensure that aeronautical communications in Categories 1 to 6 of Article S.44 are given priority and immediate access at all times.**

Note.— For more information refer to the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies (Doc 9718), Chapter 7, Section 1 525 - 1 559 and 1 626.5 - 1 660.5 MHz).

3.12 WRC-2000 Agenda Resolves 1.11 — To consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)

3.12.1 - 3.12.2 [Background]

3.12.3 **ICAO POSITION**

- 3.12.3.1 **Maintain all aeronautical allocations below 1 GHz without change and taking account of the ICAO position on Agenda Item 1.1 in regard to S5.181, S5.197 and S5.259.**

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3.17 **WRC-2000 Agenda Resolves 1.15.1 — To consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments**

3.17.1 The allocation to the radionavigation service in the band 1 559-1 610 MHz supports operations of GLONASS and GPS, the two radionavigation satellite systems which, together with supporting augmentation systems, are the presently identified elements of the ICAO GNSS system. The availability of adequate spectrum to support second generation systems or to enhance the current use of GNSS is fully supported. Due account must be given to the effect of additional allocations on the current usage of frequency bands where additional RNSS allocations are proposed. No requirements are foreseen for RNSS systems in the band above 5GHz. With respect to the possible use of the band 1 164 - 1 188 MHz by an additional GNSS frequency, ICAO is considering compatibility aspects to secure protection of the current aeronautical users of this band.

3.17.2 Support the availability of adequate spectrum for GNSS systems taking into account the result of studies assessing the compatibility between RNSS and the current allocation to the band being considered. Protection needs to be given to ensure that current users of the band are not affected by these allocations.

3.17.3 **ICAO POSITION**

- 3.17.3.1 **To support the availability of adequate spectrum for GNSS systems.**

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3.19 **WRC-2000 Agenda Resolves 1.15.3 — To consider the status of allocations to services other than the radionavigation-satellite service (Nos. S5.355 and S5.359) in the band 1 559 - 1 610 MHz**

- 3.19.1 [Background]

3.19.2 **ICAO POSITION**

3.19.2.1 **The operation of fixed service on the frequencies between 1 559 and 1 610 MHz should be discouraged and ceased.**

Note.— For more information refer to the ICAO Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies (Doc 9718), Chapter 7, Section 1 559 - 1 626.5 MHz.

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